Makeham's curve to the general population will be of great interest to all statisticians.

The publication of these lectures marks, we hope, a turning-point in actuarial graduation; it means that the study of curve-fitting has now become a part of the curriculum of the actuarial student, and a knowledge of frequency curves must be acquired before the diploma of the Institute is won. This recent development has enormously increased our power of interpreting statistics, and Mr. Hardy will have done actuarial science a great service if this book induces the other members of his profession to follow in his footsteps.

MODERN ORDNANCE.

The Engineering of Ordnance. By Sir A. Trevor Dawson. The Gustave Canet Lecture, delivered at the Twenty-fifth Anniversary Meeting of the Establishment of the Junior Institution of Engineers, at the Hall of the Worshipful Company of Fishmongers, June 30, 1909. Pp. iv+53. (London: Percival Marshall and Co., 1909.) Price 2*s.* 6*d.*

IT is generally understood that progress made in the construction of guns, gun-mountings, explosives, and projectiles during the last half-century far exceeds that made in the preceding five hundred years; but the causes of this great advance, and the methods by which it has been accomplished, are not so well known. In this small book, of little more than fifty pages, the author has summarised the facts in a clear and interesting style, in a fashion perfectly intelligible to ordinary readers. The descriptions of ordnance are assisted by means of a series of excellent illustrations representing ancient weapons as well as the most recent types.

The author is an eminent authority on the subjects of which he treats, and he is a master in the art of exposition. As director in charge of the Ordnance Department of Vickers, Maxim and Co., Sir Trevor Dawson has been able to utilise the valuable training and experience he had previously gained in the Royal Navy, and to play a prominent part in recent advances. The value of the work done by him has just been recognised by a knighthood, and many professional friends will join in congratulating him upon this well-deserved honour. The Junior Institution of Engineers was fortunate in obtaining the services of such a man as their first lecturer and gold medallist under the Canet bequest.

M. Gustave Canet was a most distinguished French ordnance engineer who received his principal training in this country under the late Mr. Joseph Vavasseur, and subsequently did much to advance the design and construction of ordnance in his native country in association with the great firm of Schneider and Co., of Creusot. M. Canet was president of the Institution of Junior Engineers in 1907–8; his death occurred at the close of his term of office, and his family founded a Canet Gold Medal as a memorial in accordance with a wish he had expressed. No fitter tribute to his professional eminence could have been paid than that which the volume under review contains—a tribute from a British ordnance engineer of the first rank to the work which his French collaborateur had done in improving ordnance for both sea and land purposes.

The author has compressed and condensed a considerable mass of material into the modest limits mentioned above, at the same time indicating the great range and variety of the subjects affecting the design of modern ordnance. He has also maintained his sense of proportionate value in dealing with each item. He shows how important have been contributions made by metallurgists, chemists, and mechanical engineers, and how essential has been the work of each. Improvements in steel manufacture lie at the root of advance in gun-construction and the making of projectiles. The chemist has played a great part in these improvements, and has devised much more powerful "propellants" to take the place of gunpowder, as well as high explosives which can be safely fired from guns and be capable of working havoc on an enemy's forces or ships. The mechanical engineer has been no less useful; indeed, it is his lot to utilise all that metallurgists and chemists can do so as to embody their latest discoveries in designs for more powerful and accurate artillery, or in the construction of more efficient gun-mountings. Hydraulic, electric, and pneumatic methods of transmitting and utilising power in connection with ordnance all find a place and use, their relative value and efficiency being differently assessed by different authorities.

Sir Trevor Dawson states the case fairly, and records his own opinions in many instances. For example, what he says in regard to "wire-wound" and "solid-steel" systems of gun-construction is well worth study; and equally so are his remarks on the advantages and disadvantages of hydraulic or electrical power for working and loading heavy guns; or his comparisons of nitro-glycerine and nitro-cellulose powders. All these questions must be studied in the original volume, as limits of space prevent even a summary being given of the author's conclusions. Every reader of the book will gain a clear idea, not merely of the ingenious devices now in ordinary use for loading and working heavy guns or quick-firing guns of moderate size and weight, but of the means by which present practice has been attained. Behind the complete control and apparently easy handling of the largest guns there lies a mass of complicated machinery for the proper maintenance and use of which highly trained staffs are necessary. The "sweet simplicity" which prevailed before steam-power and armour-defence came into use has entirely disappeared, and cannot be restored. One comparison may be mentioned in conclusion. In 1864 the most powerful 12-inch gun was a muzzle loader, twelve calibres in length, weighing about 23·5 tons; its charge of powder weighed 85 lb., the muzzle velocity of the 614 lb. projectile was 1300 feet per second, and it could perforate 16 inches of wrought-iron armour at the muzzle, or 8 inches at the maximum range of 6000 yards. The 12-inch gun of 1909 is a breech-loader, fifty calibres long, weighing nearly 70 tons. Its projectile weighs 850 lb., the muzzle velocity is 3000 feet per second, its perforative power is measured by 52 inches of wrought iron at the muzzle, 37 inches at

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6000 yards, and 17·5 inches at 24,000 yards. Readers interested in the subject will find in the book many equally instructive comparisons, illustrating the great strides made during recent years in the engineering of ordnance.

W. H. W.

VEGETABLE PROTEINS.

The Vegetable Proteins. By Dr. Thomas B. Osborne. Pp. xiii + 125. With Bibliography. [Monographs on Biochemistry. Edited by Dr. Aders Plimmer and Dr. F. G. Hopkins.] (London: Longmans, Green and Co., 1909.) Price 3*s.* 6*d.* net.

THE extent to which the knowledge of the proteins has increased during the last decade is abundantly witnessed by the fact that this is the fourth in this series of biochemical monographs which is devoted to them. Dr. Osborne is undoubtedly the leading authority on the chemistry of the vegetable proteins, and much of the matter considered in this essay was originally made known by his researches. The vegetable proteins are of importance, not only on their own account, but also because of their analogy to the animal proteins, which are being so closely studied at the present time. For this reason, this monograph will be welcomed by animal physiologists.

The author has chosen to treat the subject broadly, and to give a general discussion of the chemical and physical properties of vegetable proteins rather than to describe the individual proteins. Whilst this method of treatment will commend itself to many, it must not be forgotten that there is nothing fundamental to distinguish vegetable from animal proteins as a whole, and there is a danger of setting up some artificial distinction between the two classes.

A clear distinction is made between the proteins of the plant embryo and the reserve proteins of seeds, which so far have been the materials chiefly examined. The reserve proteins are all very characteristic and yield large proportions of some particular amino-acid when hydrolysed. As Pfeffer has pointed out, they are to be regarded as excretory products, for they can take no further part in metabolism, and are lost to the plant. The reserve proteins are far more stable towards chemical reagents than are the living tissue proteins; this property has enabled them to be more drastically purified than most of the proteins of animal origin.

Perusal of the monograph will very rapidly convince the reader of the great experimental difficulties attending work in this field, partly on account of the great tendency to form colloidal precipitates which are difficult to manipulate, and partly because no absolute methods are at present known which enable one protein to be separated from another.

Although, on the whole, it must be admitted we are only just beginning to gain some insight into the chemical nature of proteins, yet a work of this kind, like the other monographs which have preceded it in the series, is so stimulating, and suggests so many possibilities of research, that it requires no other justification for its issue, and it should be in the hands of every earnest student of biochemistry.

We could have wished the author to have been more exhaustive in his treatment, and to have included, for example, some discussion of Dr. H. T. Brown's recent work. The inter-relationship of the proteins of wheat likewise deserves much fuller discussion.

In conformity with the editors' plan, a bibliography of no fewer than 608 papers, arranged alphabetically according to the authors' names, has been added. The publishers may be congratulated on the improved cover. A further advantage in the style of the series is the possession of the wide margins, which enable the reader to amplify the text by his own notes.

E. F. A.

MORPHOLOGY AND MEDICINE.

Clinical Commentaries deduced from the Morphology of the Human Body. By Prof. Achille De-Giovanni. Translated from the second Italian edition by John Joseph Eyre. Pp. xii + 436. (London: Rebman, Limited, 1909.) Price 15*s.* net.

THE object of the author of this work is to lay anew the foundations on which the principles and practice of the physician's art are based. The new foundations are the principles of morphology—morphology as expounded by Haeckel, Gegenbaur, and other great anatomists. Like all enthusiastic reformers, as one may infer from the following passage (p. 206), he has evidently suffered considerably at the hand of his Italian confreres:—

> "The academicians (I call them academicians because, according to their way, they have made known that the epithet of colleague is not suitable)—the academicians will not demean themselves by accepting these stupid things. Then there are those who, posing as reforming geniuses, let fly a smile of compassion, and others who, from the Olympus of the hypercritical criticism of which they seem specialists, qualify these things in the presence of the credulous public as works of magic, because they do not seek to comprehend them."

By way of apology for Prof. De-Giovanni's medical confreres, the reviewer must confess that a full comprehension of these new doctrines is not an easy matter. As in some of the more recent novels of Henry James, one is puzzled to know whether the obscurities are due to a lack of sense on the part of the reader or of the writer. At least, from the following passage in the preface, in which Prof. De-Giovanni explains his purpose—and there are passages equally obscure on every page of the book—it is evident that the translator has found an equal difficulty, and, apparently, has abandoned as hopeless the task of making the meaning of the original clear:—

> "Therefore I think that every clinical investigation should be conducted on the basis of the individuality morphologically verified, for every other verification of the facts and phenomena in relation to doctrine and practice in their turn in every concrete case individualise themselves, or, to speak better, present themselves, not such as they may be according to the data of general biological experience, but such as they must be in the morphological type of the individual under examination."

Instead of speculating on the exact meaning of the passage just cited, it will be more profitable to follow Prof. De-Giovanni into his clinic, attached to the Uni-

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